



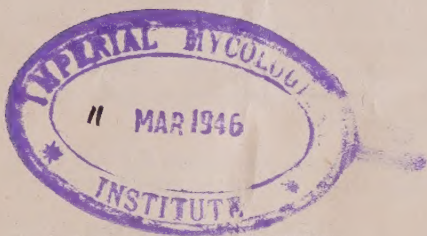
Northern Rhodesia

Department of Agriculture

ANNUAL REPORT

for the year

1944



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Northern Rhodesia

DEPARTMENT OF AGRICULTURE

Annual Report for the Year 1944

In accordance with instructions this report is presented in abridged form. The issue of Agricultural Statistics forms to European farmers has been suspended during the war period. Reliable figures for the quantities of the more important crops produced for sale by farmers are, however, available from other sources.

AGRICULTURE IN THE TERRITORY.

1. In general the early part of the season was most favourable. Although conditions deteriorated somewhat towards the close, the season, on the whole, was the best since the outbreak of the war.

Maize : Railway Belt.

2. Maize production increased sharply and might have approached a record on European farms had a prolonged wet, dull spell not intervened in the latter part of February and early March. This caused some water-logging and inhibited pollination of part of the crop. The total production on European farms approximated to 270,000 bags with an average yield of about $6\frac{1}{2}$ bags per acre.

3. The native-grown crop showed even more improvement over the previous year and in parts of the Reserves was very good indeed. Abnormally large quantities of maize were retained in the villages. There was a distinct tendency towards a switch-over to kaffir-corn in some areas, largely due to the fact that a higher cash price had been offered for this crop in the previous year. This tendency was unwelcome in present circumstances as kaffir-corn does not store as well as maize. It has been checked by lowering the price.

4. The following table shows maize production for sale in the railway belt, exclusive of a considerable volume of inter-village trade, during the past four years.

MAIZE PRODUCTION FOR SALE.
(Thousands of Bags.)

<i>Year</i>	<i>European</i>	<i>Native</i>	<i>Total</i>
1941	120	38	158
1942	146	51	197
1943	144	60	204
1944	212	115	327

5. In addition to the 327,000 bags received from the railway belt, 9,000 bags were sent in from distant areas. The greater part of this came from the Eastern Province. The Civil Supplies Department also purchased 16,000 bags of kaffir-corn in the railway belt.

6. The improvement in the supply position permitted the removal of rationing half-way through the year and consumption rose from 391,000 to 445,000 bags. 295,000 bags were imported.

Wheat.

7. Both the acreage under wheat and the crop increased. Last year's record was broken by a total crop of approximately 25,000 bags, of which 23,157 bags were sold.

Tobacco : Eastern Area.

8. The Eastern Area enjoyed a fair season and remarkably good prices. Some crops were of excellent quality and the top grades attracted keen competition in the Quota market, resulting in

the stupendous average price of 52.36 pence per lb. Non-quota tobacco averaged 14.56 pence and the over-all average was 21.53 pence per lb. The total weight of leaf sold was 2,058,000 lbs.

Tobacco : Western Area.

9. Here the season was a difficult one and the late rains caused considerable loss. Quality improved, however, and the crop sold well. As no auction sales are held in the Western Area, prices cannot be given. The total production of Virginia flue-cured leaf was approximately 240,000 lbs. Turkish tobacco production is now attracting considerable attention in the railway belt. Some 80,000 lbs. were sold and very marked increase in production in 1945 is assured.

Rubber.

10. The department continued to purchase, check-grade and despatch wild rubber to the Union of South Africa. Production, though still very small in relation to the available reserves of rubber-bearing plants, was trebled and quality improved considerably. During the year the following rubber was received :

Description	Grade	lbs. received	Current Price per lb. f.o.r. Mazabuka	
			s.	d.
Tapped Sheet	S.T.1	8,634	2	6
	S.T.2	4,212	2	0
	S.T.3	1,086	1	3
Tapped Ball	T.1	1,361	2	3
	T.2	2,037	1	9
	T.3	459	1	0
Bark Rubber	B.1	60,868	2	0
	B.2	134,182	1	6
	B.3	19,897	0	9
	Undergrade	2,389	0	6
Total		235,125 lbs.		

11. The bulk of the more readily accessible reserves of *Landolphia* and *Carpodinus* lie in Mwinilunga and Balovale Districts and in parts of the Barotse Province. A conservative estimate of potential annual production by the available resident population, using hand methods only and with due allowance for the priority which must be given to food production, is given below, together with actual production in 1943 and 1944.

District			Potential Production (short tons)	Production 1943 (short tons)	Production 1944 (short tons)
Balovale	...	...	108	4.5	58.6
Mwinilunga	...	...	90	16.7	26.8
Mongu	...	...	45	3.3	5.5
Senanga	...	...	41	1.2	2.6
Mankoya	...	...	36	4.6	12.6
Kalabo	...	...	28	nil	3.5
Sesheke	...	...	15	5.1	1.3
Other Districts	...	...	—	5.3	6.6
				40.7	117.5

12. The most noteworthy increase is in Balovale District which, with Mwinilunga, has always led the way in the production of another "collected product"—beeswax. Hand methods of extraction of wild rubber are exceedingly laborious and even the present scale of prices does not give the collectors of bark rubber (the great majority) remuneration equivalent to that they could earn from unskilled employment in their areas—for example, as carriers. In these circumstances present production must be regarded as satisfactory; its achievement is due mainly to the drive of the District Commissioners concerned.

The Red Locust (*Nomadacris septemfasciata*).

13. Very little locust activity and no damage to crops were reported. Small concentrations of hoppers in the Mweru wa Ntipa area were destroyed by the International Locust Control Organisation. Small hopper bands were also present in Kalomo sub-district early in the year. From April to July a few flying swarms were reported. Most of them were moving westward and two crossed the railway belt.

Food Production Committee.

14. The activities of this body, of which I am Chairman, have been recorded in a separate report.

THE WORK OF THE DEPARTMENT.

15. One additional Agricultural Officer was appointed and one Agricultural Supervisor resigned. R. H. Fraser and J. N. Clothier were promoted to Senior Agricultural Officer. At the end of the year the European establishment was :—

<i>Approved</i>	<i>Actual</i>	<i>Post</i>
1	1	Director.
1	1	Assistant Director.
1	1	Ecologist.
3	3	Senior Agricultural Officers.
10	8	Agricultural Officers.
10	7	Agricultural Supervisors.
4	3	Clerks (two part-time).

16. Forestry continued to be administered as a sub-department. The years' work is briefly reviewed in Part II of this report.

17. The Ecologist completed the compilation of a 1:1,000,000 soil-vegetation map of the Territory and this will be published shortly. The data were mainly derived from the Ecological Survey but the results of more detailed departmental surveys of certain areas were incorporated, and use was made of such aerial photographs as were available.

18. Soil conservation and irrigation works were laid out on several European farms in the railway belt.

19. The Fort Jameson Tobacco Station continued to produce acclimatized seed for sale to planters, but it has not yet been possible to resume experimental work.

Lusaka Wheat Station.

20. Work started on the newly acquired farm near Lusaka in January and in April it was possible to establish preliminary trials of wheat varieties. A separate report on these trials has already been published for the information of wheat growers. The wheat lands had been badly eroded and exhausted by previous cropping and will serve a useful purpose in indicating how fertility can be restored. Until a Plant Breeder becomes available little selection and no breeding work can be done. There remains, however, a wide field for introduction and trial. For the time being the general scheme of work will be to introduce a number of pure lines of wheat annually and test them in small plots. The more promising will be multiplied twice on the Station during which time their behaviour, particularly with regard to rust resistance, will be closely studied. Station-grown seed will then be made available to farmers to whom full descriptions will be issued. As the Station is in a notorious "rust area" it will be necessary to arrange for trials of rust-susceptible but otherwise promising varieties on private farms under comparatively rust-free conditions.

21. The first year's trials indicated the promise of *Beltista*, *Pioneer* and *Jubilee* under local conditions. These varieties, the last two of which were bred in Salisbury, are little known in Northern Rhodesia, and their performance over the next two seasons will be watched with interest. None was appreciably affected by stem rust despite its prevalence on all susceptible varieties. *Granadero Klein* is also promising under local conditions but requires to be sown early and is inclined to "blindness" on poor soils. *Punjab 8A* and *Wit Klein Koren*, both prolific and popular varieties in rust-free areas, are definitely unsuited to conditions at the Station.

22. Indebtedness to the Plant Breeders of Southern Rhodesia and Kenya for their courtesy in supplying samples of pure lines is gratefully acknowledged.

Reclamation and Preservation of Native Areas.

(a) SOUTHERN PROVINCE.

23. Soil conservation in the main native maize-producing area was continued. The new acreage protected was somewhat less than in recent years owing to shortage of labour and because the work now lies further afield and much of it in more hilly country. The progress of the work during the last five years is illustrated in the following table :—

<i>Year</i>	<i>Acres of cultivated land protected</i>			<i>Miles of contour ridge constructed</i>	<i>Miles of grass strips demarcated</i>
1940	...	...	...	3,700	64
1941	...	...	...	9,100	146
1942	...	...	...	11,800	253
1943	...	...	...	11,400	280
1944	...	...	...	8,300	247
<i>Totals</i>	...	...	...	44,300	990
					101

The area given in this table as "protected" refers to gardens only. A vastly larger area of the countryside benefitted from the works which, in addition to the construction of contour ridges, included the demarcation of land into appropriate arable and grazing areas.

24. The contour ridges were constructed entirely by hand labour. The average total cost, exclusive of European supervision, was 2.4 pence per yard. The cost per acre of protected land varies considerably, being dependent on the topography which governs the amount of construction necessary. The average cost during the year was 10s. 11d., as compared with 8s. 2d. in 1942 and 10s. 4d. in 1943. The progressive increase is due mainly to differences in the topography of the country protected. The entire cost of soil conservation work (exclusive of European supervision) in the Southern Province was met by a grant from the accumulated surpluses of the Native Maize Pool. The money was thus contributed collectively by the native maize growers and was spent on the protection of the land that produced it.

25. Other works undertaken departmentally included the making of 47 miles of Reserve roads and the repair and enlargement of 5 dams.

26. Two of the many weaknesses in current practice are the excessively late planting of maize and the almost complete absence of restorative crops. During the year the Plateau Tonga Authority was induced to make an Order prohibiting the planting of maize or kaffir-corn after the 7th January in any year. The effect of this Order should be two-fold. It will stop the appalling waste of time and land caused by planting cereals which have little or no hope of coming to maturity (and thereby may lead to better care of the early-planted cereals) and it should encourage bean production as beans are sown after the cereal "dead-line." A force of "Land Messengers" was recruited and trained and then handed over to the Native Authority for the purpose of enforcing this and other Orders. The Land Messengers were paid by the Native Treasury which received an equivalent grant from the Native Maize Pool funds.

27. Apart from this development, the cumulative effect of which should be considerable, there is regrettably little to report in improvement of method. Almost all available manure is now certainly being used and, in places, has acquired a cash value; but far too little of it is being made for the preservation of the fertility of these extensive maize gardens. The carting of vegetable wastes and the periodical clearing-out of the kraals is "too much work." Unless a drastic change can be induced the unquestionable decline in fertility will continue.

28. In some parts, notably to the east of Monze, twitchgrass (*Cynodon dactylon*) has become a serious pest, and it may be doubted whether the simple expedient of abandoning the gardens for recovery under tall grass is practicable now that pressure on the arable land has increased. The pest has been mastered in demonstrators' gardens by intensive cleaning of the bean plot, but the amount of hand labour involved (shallow ploughing is useless) is a deterrent to general adoption of the method.

(b) EASTERN PROVINCE.

29. In the Eastern Province the method of approach to soil preservation is the dilution of population in the intensely congested Reserves by planned settlement of the newly purchased areas, followed by soil conservation works in the Reserves themselves.

30. In view of its urgency resettlement was given priority in 1942 and 1943. The pace was not maintained in 1944 but more attention was given to the consolidation of the progress already made. It has not yet been possible to proceed with major soil conservation works in the old Reserves.

31. In the village areas settled in 1941 a simple system of soil protection was provided by contour grass-strips ("*tenyardis*") separating the cultivated lands. This system has worked reasonably well, particularly where the slopes are gentle, but it throws an inordinate amount of land out of cultivation. In the later settlements it has been replaced by the conversion of the traditional mound-cultivation to cultivation on ridges running along the contour. Storm drains protecting the ridged gardens are constructed departmentally.

32. Resettlement work undertaken during the year was confined to Petauke District where 42 of Chimate's villages were moved to the Chirimanyama area. These villages had to leave their cattle in their old area along the Portuguese border for the time being because of suspected danger from "fly." Nevertheless the move was accomplished without much difficulty. The trek was a long one and some help was given in the transport of goods and chattels.

33. Almost without exception the villages in the new areas have settled down well and it is doubtful whether any would voluntarily return to the old Reserves. In Petauke District, in fact, some restraint had to be exercised on villages demanding to move across into the new areas.

(c) NORTHERN PROVINCE.

34. A greater degree of supervision over the large area now under "chitemene control" was made possible by a slight increase in European staff. There are now 235 villages (population 17,500) under the control scheme, including 13 in Mporokoso District incorporated during the year.

35. Realization is gradually dawning that the villages in the controlled area have more food than those outside and some slight relaxation of opposition to control by "outside" villages is noticeable.

36. The programme of "early burning" as an alternative to the impracticable ideal of complete fire protection of woodlands was continued over the 3,000 square miles of country covered by the scheme. The cumulative effect on the regenerating woodland is now evident.

37. Every village headman has now been issued with a booklet, printed in the vernacular, giving simple instructions covering the year's work in the gardens. Each booklet has an insertion in the form of a plan of the particular village area showing the annual cutting-blocks, those already cut being shaded.

(d) WESTERN PROVINCE.

38. The following note by the Assistant Director is given in full. Its prominence in this abridged report is out of all proportion to the volume of the work, which is on a far smaller scale than that in progress in the Southern, Eastern and Northern Provinces, but it merits publication as an example of that inter-departmental co-operation for which this department has always striven, albeit without marked success hitherto, largely owing to shortage of staff of other departments in the areas in which we are working. With co-ordinated development plans so much in the air at the present time Mr. Allan's note is particularly opportune.

"Resettlement work in the Ndola District continued on the lines laid down in 1943. Vegetation-soil surveys were completed over a further area of about 250 square miles, mainly between the railway and the Congo Border. The road programme was completed, an additional 85 miles of road being made during the year. These roads were made partly departmentally, partly by the District Officer in charge of population movement, and partly by the Water Development Department. Indeed, the whole undertaking is so much a matter of inter-departmental co-operation that it is impossible to give a picture of the work from the point of view of one department only.

"The Department of Game and Tsetse Control co-operated in the control of elephant within the area and also provided funds with which a large central fish dam was constructed on the Makanga stream. While the area as a whole is well provided with surface water, there are some dry regions, mainly on the watershed between the Kafulafuta and Muwalashi drainages. Here wells were dug by the Water Development Department.

"A grant from the Native Development Fund enabled fifty-four head of cattle to be purchased. These were distributed in small herds throughout the area, in order to settle the question as to whether or not the area is entirely free from trypanosomiasis and suitable for cattle rearing. The Agricultural Department look after the care and maintenance of the cattle and the herds are inspected monthly and blood slides taken from each beast by an Officer of the Veterinary Department. So far there has been no infection or other sickness among the cattle; they have improved greatly in condition and the only loss has been one beast killed by a lion.

"The building of a Central Boarding School was begun at Chileshe and close to the school site the District Officer is building a model village, with the active co-operation of the villagers.

"During the year fifty-nine villages, with the following estimated populations, moved into the new area; this is additional to the fifteen moved last year:

Chief	Number of villages	Estimated population 1944
Mushiri	38	4,479
Nkambo	6	770
Chiwala	15	2,108
	59	7,357

"The method of land allocation allows as far as possible for free choice of sites. Blocks having an estimated carrying capacity approximating to the total village population are demarcated around the selected sites, using roads, streams, hills and blazed lines as boundaries. A considerable mileage of boundary line was demarcated. All estimates of land carrying capacity are based on traditional Lamba agriculture. The estimated mean carrying capacity of this system for an area of about 500 square miles, to which the calculation has been applied, is 22.2 persons per square mile.

"As a first step towards improved agriculture, gardens were laid off between contour grass strips at vertical intervals of two feet. The people were encouraged to convert each strip into three parallel ridges, approximating to the normal dimensions of their mounds for subsidiary crops and to plant these with beans; or two such ridges with the remainder of the strip planted to ground-nuts on the flat—a combination of contour cultivation ridges and strip cropping. This method, an adaption of normal Lamba practice, was evolved as the result of trials made last year. The object is not only to check erosion but, even more important, to restore the cultivation of subsidiary crops, now almost entirely neglected. The planting of the ridges to beans and strips to groundnuts should restore a balance between cereals and legumes and allow of a small surplus of the latter for sale. The idea seems to be not unpopular and almost every village has made a satisfactory first effort at converting the strips to ridges, while some have adopted the combination of ridging and strip cropping. But the great difficulty has been the acute shortage of seed. Money for the purchase of seed was offered from Native Authority funds and some ground-nut seed was provided, but owing to the general shortage it was found impossible to obtain anything like a sufficiency of seed in time for planting.

"Fruit-tree seed and seedlings from the departmental nurseries were distributed to all new villages. Orchards of mango, mulberry, lemon, guava, pawpaw and banana are now being planted near the sites selected for the permanent villages.

"In accordance with normal Lamba practice, no permanent villages were built in the first year of movement, the pioneer families living in "inkunka" (temporary shelters). Partly for this reason and the need to maintain gardens at the old villages, but also no doubt because of the counter-attraction of the Mines and the increasing migration to work, the number of permanent residents at the new sites, with the exception of a few villages, has been disappointingly low,

notwithstanding the excellent propaganda efforts of the District Officer and the co-operation of the Chiefs. It was pointed out at the time of the initial survey in 1940 that it would be difficult if not impossible, to obtain voluntary migration away from the mining centres and, in spite of efforts to make conditions in the new areas as attractive as possible and to facilitate movement, the success or failure of this resettlement scheme still remains in the balance."

(e) CENTRAL PROVINCE.

39. An agricultural survey of the plateau region of Mkushi District was undertaken and completed. The area involved was some 6,000 square miles of country occupied by the Bene Ma Swaka and the Western Lala. A basic map of the district, on a scale of half an inch to one mile, was first compiled, largely from traverse data. Population distribution was plotted on this basic map and quantitative studies were made of Swaka and Lala methods of land usage, in relation to vegetation-soil types. A report on the land position within the two tribal areas was prepared on the basis of the field survey data, and recommendations were made regarding the allocation of unoccupied land and the improvement of land usage. The recommendations on improvement in land usage were considered and adopted by the Native Authorities and were incorporated as Orders.

Improvement of Food Crops.

40. The improvement of food crops in the Northern Province has received some attention in recent years and a scatter of departmental and Native Authority seed farms has been established, both to multiply and distribute improved varieties and to demonstrate improved methods.

41. Ten high yielding strains of "Male" (*Eleusine coracana*) have been selected and multiplied. Two local cassava selections, "Matutumushe" (C.4) and "Lyongo" (P.7) have so far proved resistant to mosaic disease under local conditions and are now in great demand. A trial of butter beans indicated that this crop may have considerable value. The local bean varieties almost invariably give very poor yields and their replacement by something better would be highly advantageous. The introduced sweet potato "Calabash" is proving popular.

42. Remarkably improved yields of "Male" were obtained both at Lunzuwa and at Seed Farms from transplanting. The adoption of transplanting may help to solve the serious problem of weed control in "dug" gardens. The problem naturally does not arise in "burnt" gardens.

43. During the year the following quantities of seed and planting material were distributed in the Northern Province:

Bean Seed	...	...	...	...	10 tons
Hickory King Maize	...	...	...	...	3½ "
"Masaka" (annual kaffir-corn)	...	...	...	...	2½ "
Sweet Potato Cuttings	...	...	...	...	3 "
English Seed Potatoes	...	...	...	...	3½ "
Cassava Cuttings	...	...	...	...	6 "

Cash Crops.

44. For the time being there is hardly a district in Northern Rhodesia which has not an outlet for surplus foodstuffs. The two more permanent projects, cotton and tobacco production in the Eastern Province, were maintained under departmental supervision and financed by grants from the Native Development Fund.

(a) Burley Tobacco.

45. This is grown round Minga (Petauke District). The number of growers increased to 430 and the curing of the crop by the more experienced showed marked improvement. The season was, however, a poor one largely due to the early end of the rains. Yields decreased and the crop lacked "body." 54,000 lbs. (wet weight) of leaf were bought departmentally at prices ranging from 1d. to 8d. per lb., with an over-all average of 4.26d. per lb. The average receipts per grower were £2 4s. 10d., but some men got as much as £14. The tobacco was graded and packed departmentally and transported to the auction floor at Fort Jameson where it was sold for £1,800. The average price received at the auctions was 9.3d. per lb.

(b) Cotton.

46. Cotton production in the Marambo area of the Luangwa Valley continued to decline. There were only 220 growers and the total production of seed cotton was but 27,000 lbs. The average receipts per grower were little more than 12s. Unless, with lessening demands on man-power, more interest is taken in cotton growing it may be doubted whether it will be worth while continuing with this project.

Agricultural Education.

47. The majority of the existing agricultural text-books for Africans have been published in other territories and are of little value in Northern Rhodesian schools. Indeed it may be doubted whether, within the compass of one book, a local publication applicable to the widely differing agricultural conditions of the Territory would serve a useful purpose. As a more promising alternative it is proposed to publish regional text-books containing simple but definite recommendations as to

improved practices applicable to the region, together with simple explanations. On this basis a start has been made by the preparation of a text-book for schools in the maize-belt. The book was written by C. E. Johnson, Agricultural Officer, and has now been published.

48. In the Northern Province 12 teachers graduated from the Senga Hill Agricultural and Teacher Training School and have been posted to various schools in the Province. Departmental Officers inspected 38 school gardens during the year.

49. Model maize gardens at Southern Province schools now number 54. Some are very good, some fair and others indifferent. No satisfactory general solution of the difficulties imposed by school holidays and lack of oxen and equipment has yet been found.

50. Interest in school gardens is increasing in the Eastern Province, where one or two exceedingly good ones have been established in recent years.

PART II.—FORESTRY.

51. It is estimated that all but one-third of the total area of Northern Rhodesia is covered by tree growth. The department can deal directly only with a very small proportion of this vast forest expanse of over 190,000 square miles. Its activities are concentrated in the two areas of greatest economic importance—the settled portion of the railway belt and the Mukushi (*Baikiaea plurijuga*) forests of the south-western corner of the Territory. Throughout most of the rest of the country the department can only act in an advisory capacity to Administrative and other departments.

Staff.

52. The Assistant Conservator formerly seconded to the Chamber of Mines reverted to departmental duty at the beginning of the year. This permitted the transfer of the second Assistant Conservator from the Northern to the Southern Division which had been under the control of a Forester since 1941. One Forester resumed duty in the middle of the year on his release from active service. The European staff at the end of the year consisted of two Assistant Conservators and five Foresters, two of the latter being temporary appointments and one of them a part-time appointment. A part-time European stenographer was employed at Ndola throughout the year.

53. The establishment of African Forest Rangers was increased from 25 to 33 and of African Forest Guards from 48 to 58. Four Rangers and 17 Guards were seconded for work in the Barotse Forests and paid from the Barotse Forest Fund. Suitable African recruits were difficult to obtain and wastage among both employees and trainees was high. Facilities for training were naturally limited by the paucity of European staff.

Demarcation of Forest Reserves.

54. Kipushi Forest Reserve (19 square miles) and Kafwira Forest Reserve (50 square miles) were gazetted during the year. These are two belts of unoccupied woodland of fair quality which lie along the Congo frontier, on the top of the Kafue watershed. The area of Forest Reserves in the Territory now totals 639 square miles (570 square miles in 1943). A small Protected Forest Area (Monkey Fountain) covering one square mile, was constituted and transferred to Ndola Municipality for management. The Territory's Protected Forest Areas now cover 3 square miles.

Surveys and Management.

(a) NORTHERN DIVISION.

55. Reconnaissance was carried out in a 400 square mile belt of country running northward from Broken Hill, in search for areas from which to supply Broken Hill mine with underground timbers. Almost the whole belt was found to be *Isobерlinia* woodland of poor quality in various stages of regrowth from past cycles of shifting cultivation. Two areas were reported suitable for reservation.

56. The Stocktaking Survey of the Copperbelt, described in the 1943 report, was completed at the end of 1944. The Northern Rhodesia Chamber of Mines was unable to supply European staff, and the work had to be done by the Assistant Conservator and one Forester. In four months of field work 500 square miles were sampled or reconnoitred in detail. 647 miles of sample strip were enumerated—a considerable achievement for two men working with an inexperienced African staff. A 2 per cent. enumeration was made of all belts of woodland that contained saw timber.

57. The results of the whole survey may now be briefly stated. 1,600 square miles of woodland from Bwana Mkubwa to Konkola have been examined. 373 square miles have been found to carry exploitable saw timber. These have been sampled by strips in 1-acre and 2-acre units covering from 1% to 5% of each timbered area, and totalling in all 1,620 miles. Good exploitation maps have been drawn of every exploitable area, and a general timber map of the whole Copperbelt has been compiled. The growing stock contains nearly a million saw logs, whose volume is 11,400,000 cubic feet of saw timber. The same mature areas contain 2½ million good mining poles, but larger numbers can be obtained from regrowth areas which surround the mature belts. Stocking is low. The average yield is 4 saw logs containing 50 cubic feet of good saw timber per acre. To compensate for this, the country is flat, fairly well served with communications, and very easy to exploit during the dry season. A continued consumption at the present war emergency rate of 1 million cubic feet per annum offers

an alarming prospect. Even assuming a big drop in consumption after the war, the survey shows that the Copperbelt's timber supply will need most careful husbanding, together with a very active programme of silviculture and protection.

58. Simple annual Plans of Operation were drawn up for each centre and each Forest Reserve in the Northern Division. Fire Protection, by early burning, was carried out in Forest Reserves and in exploited areas. 80 square miles of forest were subjected to intensive early burning and a further 200 square miles to more casual early burning. Essential forest roads and Reserve boundaries were maintained and extended. Eleven houses for African staff and one European rest house were built departmentally.

(b) SOUTHERN DIVISION.

59. Reconnaissance and mapping of the woodlands containing *Pterocarpus angolensis* and of the *Baikiaea* forests around Katombora, 20-40 miles up the Zambezi from Livingstone, was started at the end of the year. The record of fires and the results of a previous enumeration survey in the exploited *Baikiaea* forests on the east bank of the Machili River were incorporated on the maps of these forests.

60. Complete fire-protection was successfully carried out over 178 square miles of *Baikiaea* mutemwa forest in Livingstone district and over 260 square miles of similar forest in Sesheke district. Much of this work, especially in connection with unexploited forests, was carried out by native Forest Indunas to whom labour was provided and subsidies paid by the department. No fires of any consequence occurred in any of these forests. Protection through Forest Indunas was much less successful in the case of 50 square miles of semi-mutemwa forest in the Katombora region, which were exploited 15 to 25 years ago. Over half of this area was burned in the course of the year and it was fortunate that these fires occurred before the height of the dry season, when the damage caused would have been more serious. These more open forests in a well-populated area require more intensive fire-protection measures, and experience in 1944 suggests that fire-breaks might be early-burned with little previous preparation. In Livingstone Forest Reserve early-burning was carried out over approximately 50 square miles of woodland.

61. A start was made in the demarcation of the boundaries of Livingstone Forest Reserve and in the provision of access roads. Twelve temporary houses for African employees were built near Livingstone, and an equal number of a more permanent nature at the Machili Forest Station.

Native Development.

62. In the Northern Division proposals were made to the Agricultural and Administrative Officers in charge of the Walamba resettlement scheme for the preservation of three areas as "Chief's Forests." These were adopted. Boundaries for 1,000-acre commonages for four African towns on the Copperbelt were selected and defined on the ground.

63. Parts of Senanga and Mongu districts were visited by the Assistant Conservator, Southern Division, in December to see how the forest orders of the Barotse Native Government were being observed. In spite of no technical European assistance for five years, the native forest service appeared to be functioning surprisingly well throughout the areas visited. The main features of the scheme—the protection of useful trees and the practice of early-burning to prevent damaging late fires—were being well preserved. While the results may not be as encouraging in all districts, they certainly show that successful forest conservation can be achieved by a well-organised Native Authority working on a set plan.

Research.

64. The test plots of *Pinus* species, near Ndola, mentioned in previous annual reports, were maintained. No new planting was carried out. The species showing fastest growth were *P. insularis*, *P. patula*, *P. "teocote"*, *P. leiophylla*. Species of slower growth but good appearance included *P. montezumae*, *P. khasya*, *P. engelmannii* and *P. palustris*. After eight years of very poor growth and unhealthy appearance, *P. longifolia* began to grow normally. A fairly high proportion of individuals of most *Pinus* species showed a bad tendency to produce double leaders.

65. The research plots in natural *Isobertinia-Brachystegia* woodland at Ndola were examined by the Ecologist (Mr. Trapnell). Analysis of the data collected is not yet available. As has been explained in previous reports, several series of these plots have been maintained under regimes of early burning, late burning and complete protection for the past ten years. In the permanent sample plots, counts gave the following :

Plot			No. of established tree seedlings per acre	No. of tree species	
Late burned	...	...	175	...	40
Early burned	...	...	867	...	56
Protected	...	...	1,379	...	61

In clear felled plots under the same treatment, coppice regrowth gave :

Plot			Trees over 15 feet on 1 acre	No. of species	
Late burned	...	...	15	...	14
Early burned	...	...	101	...	26
Protected	...	...	145	...	32

66. As these plots now make a striking example to the eye of the effect of grass burning on tree growth, they were used as a demonstration area to several parties attending Chief's courses, and photographs of them were taken and distributed by Agricultural Officers for propaganda.

67. In Utilization, the Assistant Conservator, who had been seconded to the Copper Mines, spent a fortnight at Johannesburg and Pretoria, investigating aspects of mycology, entomology, saw milling and preservative treatment.

68. The eleven-year-old Termite Resistance Trial at Ndola was wound up. Seven out of 26 local timbers were termite proof. Arsenic salts proved an excellent preservative for many of the remainder; under conditions of heavy infestation and severe leaching, timbers having a wide range of absorptions (some very low) remained intact for six years and many for ten.

Industries and Exploitation.

(a) CROWN LANDS AND FOREST RESERVES.

69. The sawmills, established on each of the four copper mines during 1942-43, came into regular production in 1944. Equipment was very short and many mechanical parts had to be made in the mines' own workshops, but by the middle of the year the mills' capacity could meet the demand. Two companies were able to build up stocks for air seasoning. Logging and extraction occupied 3 Europeans whole time, 5 part time, and about 1,200 Africans. Saw milling employed 15 Europeans and 300 Africans. Timber cut by the mining companies under licence from Ndola Forest Office comprised:

		1944		1943
		cu. ft.		cu. ft.
Roan Antelope	...	232,385	...	152,000
Mufulira	...	130,025	...	Nil
Nkana	...	318,147	...	163,000
Nchanga	...	109,245	...	116,000
Kipushi	...	43,800	...	106,000

70. Mining timber continued to be imported from the Congo and from Canada in quantities larger than in 1943, though in smaller quantities than before the war. The cost of local timber remained comparatively low. Logging and extraction were an unduly large item in the cost, partly through shortage of tractors but mainly through lack of rationalisation.

71. Early in the year Rhodesian Wood Industries transferred their felling operations from the mixed woodland on Crown Land north of Livingstone to similar woodland lying 15 to 25 miles west of Livingstone. They cut in these areas some 80,000 cubic feet of timber, mostly of the following species: *Pterocarpus angolensis* (20 per cent.), *Ricinodendron rautanenii* (30 per cent.), and *Copaifera coleosperma* (30 per cent.). The firm also obtained nearly 5,000 cubic feet by import and from private land. They produced a total of 15,000 cubic feet of plywood and veneers, and employed an average of 3 Europeans, 4 Euraficans, and 180 Africans throughout the year.

72. Poles felled under licence numbered nearly 160,000. This figure excludes fellings in all Native Authority areas and out-stations. The increase is due largely to supplies sold to Broken Hill. There was a big drop in demand from Defence Works and War Evacuees Camps. Firewood sold under licence amounted to almost 45,000 cords, as compared with 52,000 cords in 1943.

(b) BAROTSE FORESTS.

73. The Zambezi Saw Mills continued the exploitation of the Rhodesian Teak (*Baikiaea plurijuga*) forests of Sesheke district. In November they moved from Simungoma to Sisisi Forest, leaving the northern part of the former to be completed later. In these forests they cut 2,900,000 cubic feet of timber. Throughout most of the year they also cut Mukwa (*Pterocarpus angolensis*) and a few other species in separate woodland areas, and obtained from these areas another 106,000 cubic feet. Three-quarters of this timber was Mukwa and two-thirds of it consisted of relatively small logs which were mostly converted to "Sap Mukwa," which, as it contains a considerable amount of sap-wood, is not suitable for cabinet work, but is much in demand for joinery and box-wood at the present time. A small quantity of Mopane (*Copaifera mopane*) was also cut and sawn up for knife-handles, a purpose for which this extremely hard and close-grained wood seems well suited.

74. The Company's output of sawn timber totalled 990,000 cubic feet, made up of the following:

Rhodesia Railway Sleepers	...	...	464,500 cu. ft.	(100 per cent. <i>B. plurijuga</i>)
South African Railways sleepers	...	...	53,500 "	(100 per cent. <i>B. plurijuga</i>)
Mining Timber	...	...	213,000 "	(100 per cent. <i>B. plurijuga</i>)
Flooring, Furniture and Joinery	...	...	30,500 "	(70 per cent. <i>B. plurijuga</i> , 30 per cent. <i>P. angolensis</i> , and others)
Handles and Spokes	...	...	2,500 "	(100 per cent. <i>Pterocarpus stevensonii</i>)
Miscellaneous	...	...	226,000 "	(75 per cent. <i>B. plurijuga</i> , 25 per cent. other species)
Total	...	...	990,000 "	

75. The Company employed an average of 120 Europeans, 16 Eurafricans, and 3,950 Africans during the year. They paid a gross sum of £5,050 in timber fees, of which £750 was paid to the Barotse Native Government and £4,300 accrued to the Barotse Forest Fund.

76. A summary of the Forest Produce cut under Licence in 1944 is given in the Appendix to this Report.

Imports and Exports.

77. Details of imports and exports are regarded as confidential and may not be published during the war.

Finance.

78. The revenue derived from Crown Land and Forest Reserves during the financial year amounted to £12,632 (1943—£9,500). The increase closely corresponds to the increased cutting by the mines. Including the revenue paid to Barotse funds by the Zambezi Saw Mills (£5,050), fees accruing to the Lenje Native Reserve Fund (£300), and the value of free issues (£1,800), the total of fees payable on timber cut under the control of the Forestry Branch during 1944 was close on £20,000.

79. Government expenditure on Forestry amounted to approximately £11,500, of which £1,500 was the contribution to the cost of the Enumeration Survey of the Copperbelt Forests. Expenditure from the Barotse Forest Fund was approximately £1,300.

MAZABUKA,
10th May, 1945.

C. J. LEWIN,
Director of Agriculture.

APPENDIX.

SUMMARY OF FOREST PRODUCE CUT UNDER LICENCE, 1944.

District	Timber (Cubic feet)		Poles (Number)		Firewood (Cords of 128 stacked cu. ft.)		Revenue Collected (£)		Total
	Crown Lands	Forest Reserves	Crown Lands	Forest Reserves	Crown Lands	Forest Reserves	Crown Lands	Forest Reserves	
Ndola and Kipushi ...	12,328	44,506	30	21,693	400	7,521	197	1,638	1,835
Luanshya ...	236,148	22,492	1,889	131	1,236	7,677	1,977	939	2,916
Kitwe ...	364,570	—	6,386	501	9,493	1,042	2,853	189	3,042
Mufulira ...	135,483	—	1,321	—	2,634	—	1,160	—	1,160
Chingola ...	111,808	—	1,569	—	301	—	1,072	—	1,072
Broken Hill ...	4,820	—	67,514	190	2,300	2,037	726	217	943
Lusaka ...	—	289	496	3,050	1,212	2,159	109	274	383
Livingstone ...	80,000	40	3,263	—	165	2,762	909	299	1,208
Other Districts ...	5,080	—	130	—	27	—	73	—	73
	950,237	67,527	82,598	25,565	17,768	23,198	9,076	3,556	12,632
Combined totals Crown Lands and Forest Reserves ...	1,017,764 cu. ft.		108,163 poles		40,966 cords			£12,632	
Barotse Forest Fund ...	3,007,000 "		—		—			£5,050	
Lenje Native Reserve Fund ...	1,294 "		1,063 poles		2,556 cords			£303	
Free issues. All Districts ...	10,830 "		50,263 "		1,209 "			£1,805	
GRAND TOTALS ...	4,036,888 cu. ft.		159,489 poles		44,731 cords			£19,790	